

## CACTUS MOTH

by

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### **C. cactorum** haplotypes reared on *Opuntia* spp.

Three of the four phylogroups of *C. cactorum* in Argentina (Marsico et al., 2011) were field collected as larvae and brought to the lab. The northeastern haplotype (NE) was collected on *O. anacantha* and *O. elata* var. *cardiosperma* in Chaco; the eastern haplotype (E) on *O. megapota mica* in Entre Ríos, and the central haplotype (C) on *O. ficus-indica* in Córdoba. Adults emerged were kept in tulle cages for their F<sub>1</sub> to compare larval performance on one of the following: *O. megapota mica*, *O. anacantha*, *O. elata* var. *cardiosperma* and *O. ficus-indica*; 9-13 replicates were considered. Test plants (2-year old) were potted from cladodes. An eggstick section of 30 mature eggs from each haplotype was glued to the terminal cladode in caged plants, which were replaced as needed. Pupae were removed, placed in plastic cups for adult emergence and adults were stored in 96% ethanol for wing measuring. The proportion of pupation was compared with 2-way ANOVA. Adult emergence is in progress.

### **Results**

Larval survival of the haplotypes differed among the hosts (Fig. 1,  $F_{11,118} = 7.66$ ,  $P < 0.0001$ ). Haplotype C showed higher survival than haplotypes E and NE (0.43, 0.27 and 0.20, respectively). *Opuntia ficus-indica* was the best host for the three haplotypes, whereas haplotypes E and NE showed the lower larval survival on *O. anacantha* and haplotype C on *O. elata* var. *cardiosperma*, not significantly different from *O. anacantha*. The survival on *O. elata* var. *cardiosperma* and *O. megapota mica* was similar.

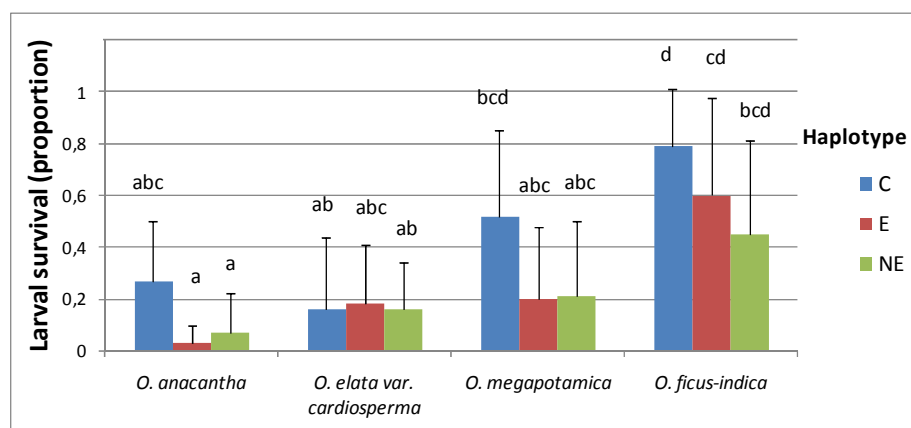


Fig. 1. Proportion of *C. cactorum* larvae that pupated on four *Opuntia* hosts. Larvae belonged to haplotypes C = center; E = eastern; and NE = northeastern.

### **Southern distribution of *C. cactorum* in Argentina**

According to Heinrich (1939), Dodd (1940) and Mann (1969), the southern boundary of the *Cactoblastis* distribution in Argentina is northern Córdoba, Santa Fe and northern Buenos Aires provinces. However, opportunistic collections in the centre of Argentina indicated its

presence further south. We conducted a survey in 83 sites with 10 *Opuntia* spp. in Buenos Aires, Río Negro, La Pampa, Mendoza and San Luis to establish the southern limit of *C. cactorum* and to record their associated host plants in the new area.

## Results

Larvae of *C. cactorum* were collected at 10 (12%) sites feeding on *O. ficus-indica*, *O. megapota mica* and *O. penicilligera* (Table 1). Its geographic range was extended to southern Buenos Aires, Río Negro and La Pampa provinces.

Table 1. Sites with *C. cactorum* on *Opuntia* spp. in Buenos Aires, Río Negro and La Pampa.

Host plant	Patches sampled	Sites with <i>C. cactorum</i>
<i>O. arechavaletae</i>	3	0
<i>O. bonaerensis</i>	14	0
<i>O. elata</i> var. <i>cardiosperma</i>	1	0
<i>O. elata</i> var. <i>elata</i>	3	0
<i>O. ficus-indica</i>	16	4
<i>O. megapota mica</i>	25	5
<i>O. monocantha</i>	2	0
<i>O. penicilligera</i>	2	1
<i>O. robusta</i>	5	0
<i>O. sulphurea</i>	12	0
Total	83	10

## Laboratory rearing of *Apanteles* sp.

Despite the taxonomy of *Apanteles* is still in progress, the presence of a new species in Argentina was confirmed on *C. cactorum*. Progress was made on the laboratory culture of *Apanteles* n. sp. Adult wasps were confined for mating in a 5L plastic bottle with honey and moisture. After 24-72 hs, one-two females were transferred to a new container with eggs or larvae of *C. Cactorum* with the following approaches: 1) *C. cactorum* first-second instar larvae (71 trials) placed over a slice of cactus tissue to allow feeding and avoid hiding from the female wasp, which were removed after 48 hours; 2) the same with *C. cactorum* third instar larvae (7 trials); and 3) mature eggsticks with 10, 30 or 50 eggs placed over a piece of cladode and exposed to female wasps until death (25 trials). Once the experiment finished, larvae fed on *O. ficus-indica* until pupation of *C. cactorum* or *Apanteles* sp.

## Results

Approach #1 produced 69% of the replicates with at least one parasitized larvae; approach #2 did not produce parasitized larvae and was removed from the analysis; and approach #3 is still in progress. In 52 trials of approach#1 field collected females of *Apanteles* sp. ( $F_0$ ) were used and the subsequent 19 trials were conducted with their progeny ( $F_1$ ). The highest percentage of parasitized larvae (16.31%), the smallest proportion of males (0.68), and the lowest number (7.36) of *Apanteles* emerged per host larva were obtained when two  $F_1$  females were simultaneously confined with the cactus moth larvae (Table 2). In addition, the highest amount and percentage of parasitized larvae was obtained exposing 20-29 larvae of *C. cactorum* to a single female *Apanteles* (Table 3).

Table 2. Laboratory rearing of *Apanteles* sp.: *Cactoblastis cactorum* larvae exposed to one or two females of *Apanteles* sp., from the field (F<sub>0</sub>) or from a previous laboratory rearing (F<sub>1</sub>).

<i>Apanteles</i> origin	Females <i>Apanteles</i> sp. confined	# trials	Exposed larvae	Parasitized Larvae (%)	<i>Apanteles</i> emerged	<i>Apanteles</i> / parasitized larvae		Proportion of males emerged	
						Mean	SD	Mean	SD
F <sub>0</sub>	1	52	1541	117 (7.60)	1165	13.10	5.29	0.76	0.40
F <sub>1</sub>	1	13	379	33 (8.71)	187	10.21	1.70	0.75	0.46
	2	6	190	31 (16.31)	286	7.63	2.96	0.68	0.30
<b>Total</b>		<b>71</b>	<b>2110</b>	<b>181 (8.58)</b>	<b>1638</b>	<b>11.30</b>	<b>6.95</b>	<b>0.75</b>	<b>0.39</b>

Table 3. Densities of larvae of *C. cactorum* exposed to a single *Apanteles* sp. female.

Exposed larvae	# trials	Parasitized larvae (%)	
		Mean	SD
1-19	18	0.5 (7.55)	10.69
20-29	26	3.42 (12.36)	8.80
30-50	21	2.48 (4.94)	6.25

### Field Trips

- Nov 2-6, 2010. To Córdoba, Chaco, Formosa to collect *C. cactorum* larvae and *Opuntia cladodes* (Varone, Mengoni Goñalons).
- Dec 2-9, 2010. To Entre Ríos and Uruguay to survey for *C. cactorum* (Varone, Ervin, Brooks, Zamudio).
- Feb 14-17, 2011. To Córdoba and Entre Ríos to set pheromone traps (Varone, Logarzo).
- May 7-15, 2011. To Buenos Aires, Río Negro, La Pampa, San Luis and Mendoza to survey for *Cactoblastis* and other pyralids, and their associated *Opuntia* spp. (Logarzo, Varone).

### Future Plans

- Continue laboratory rearing of *Apanteles* sp. and specificity tests.

### Relevant accomplishments

- Larval performance studies on other haplotypes of *C. cactorum*.
- A new southern limit of the distribution of *C. cactorum* in Argentina was established.
- The discovery of a new *Apanteles* sp. and its improved lab rearing.

### References

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